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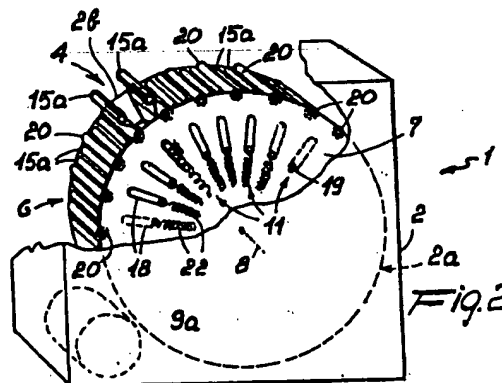
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(54) **Apparatus and process for conducting deposit and drawing operations of banknotes and valuables**

(57) It is provided an apparatus comprising a protective envelope (2) having one aperture (3), casings (4) for banknotes and valuables (5), support and movement members (6) engaging the casings (4) and adapted to impose a first movement along a selection path to said casings, and electronic control means (9), the casings (4) being movably in engagement with the support and movement members (6) in a direction transverse to the selection path, and translation members (10) being also arranged which are adapted to impose a second movement to the casings (4), which is transverse to the selection path and passes at least close to the aperture (3), to make the casings (4) accessible for deposit and drawing operations manually carried out through the aperture (3).



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## Description

The invention relates to an apparatus and process for conducting deposit and drawing operations of banknotes and valuables.

It is known that for protection of banknotes and valuables, either a traditional safe or the like can be used or a new apparatus such as that described in the European Patent Application publication No. EP-A-604880.

The traditional safe however represents a hindrance when frequent deposit and drawing operations are carried out, such as in banks for example, whereas said new apparatus, while ensuring maximum safety, also facilitates all deposit and drawing operations.

It comprises a protective envelope provided with apertures for depositing and drawing banknotes and affording a plurality of internal casings for the banknotes.

The casings are movable and selectively brought to positions in register with the envelope apertures, by movement means submitted to suitably programmed electronic control members.

Within the envelope, the casings can be easily opened and therefore, in order to avoid the banknotes being drawn in an illicit manner, by introduction of hands into the apertures for example, said apertures are protected by electronically-controlled movable safety partitions.

Banknotes are then distributed by appropriate ejecting members causing the banknotes housed in the casings to be moved forward towards the drawing point.

While this new apparatus is advantageous and satisfactory in some aspects, it also has some drawbacks.

In fact, the safety requirements impose the presence, control and movement both of said safety partitions and ejecting members.

This complexity affects costs increasing them and therefore represents a hindrance to the apparatus spreading.

Due to the mechanical distribution of the banknotes, they need to be supplied as much as possible in a very orderly manner.

In addition, the inner casings become accessible when for any reason protection of said movable partitions is not working and in any case the protective envelope is the only protection cover therein provided.

Under this situation, the aim underlying the present invention is to essentially obviate the above mentioned drawbacks.

This aim is substantially achieved by an apparatus to conduct deposit and drawing operations of banknotes and valuables comprising: a protective envelope having at least one aperture, a plurality of casings for banknotes and valuables located within said protective envelope, support and movement members engaging said casings and adapted to impose a first movement along a selection path to said casings, and electronic control means, said casings being movably in engagement with said support and movement members, in a

transverse direction relative to said selection path, and translation members being arranged, which are adapted to impose to said casings a second movement transverse to said selection path and passing at least close to said at least one aperture, to make said casings accessible to deposits and drawings manually executed through said at least one aperture.

Description of a preferred embodiment of the invention is now given hereinafter, by way of example, illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of the apparatus taken as a whole, with a casing located close to a deposit and drawing aperture;

Figure 2 is a cut-away view in perspective of a portion of the apparatus shown in Fig. 1;

Figure 3 shows some casings of the apparatus, in several different positions;

Figure 3a shows how some casings of the apparatus are arranged in a particular embodiment of said apparatus;

Figure 4 is a perspective view of a casing during the displacement step towards said aperture;

Figure 5 shows a portion of the apparatus close to said aperture and accident-prevention elements provided at said aperture;

Figure 6 is a fragmentary perspective view showing how the apparatus is arranged in the periods of non-use of same;

Figure 7 is a elevational side view, only partly in section, of translation members for the casings;

Figure 8 is a perspective view of a detail of the translation members shown in Fig. 7; and

Figure 9 is a cut-away perspective view of a portion of the apparatus showing said translation members together with locking elements for the casings.

With reference to the drawings, the apparatus according to the invention is generally denoted by 1.

It comprises a protective envelope 2 having features of high strength and provided with at least one aperture 3. In the preferred solution only one aperture 3 exists for introduction and distribution of banknotes and valuables.

The protective envelope 2 internally has a plurality of casings 4 adapted to hold banknotes or valuables 5.

Casings 4 are disposed at consecutive positions with respect to each other, so as to form a ring, a circular ring in particular, and are subjected to two completely differentiated movements.

A first movement extends along a ring-shaped selection path, in particular of circular form, defined by the arrangement of casings 4.

A second movement extends in a direction transverse to the first movement and in particular at right angles to the selection path, in a radial direction.

In detail, casings 4 are supported and guided by support and movement members 6 comprising two circular plates 7, parallel to each other, between which the

casings 4 are fitted.

For accomplishment of the first movement, plates 7 are rotatably engaged, at a rotation axis 8, within the protective envelope 2 and are moved by an electric motor 9a interlocked to electronic control means 9, known per se.

The second movement, which is radial to the rotation axis 8, is made possible because casings 4 are movably in engagement with the support and movement means 6 and because translation members 10 are present which are interlocked to the electronic control means 9 as well.

The translation members 10 are adapted to translate at least one casing 4 towards the access opening 3 when said casing is at a predetermined transferring position 2b located along said selection path.

For example, the transferring position 2b is the selection path point which is the closest to the aperture 3.

During this second movement too the casings 4 are still in engagement with the support and movement members 6 within which guide channels 6a are defined, along said channels each casing 4 being able to translate between two positions: an advanced position located close to the aperture 3 and a retracted position, spaced apart from the aperture 3.

The translation members 10 comprise guide elements 11, formed in the support and movement members 6 enabling translation of casings 4 between an advanced position projecting from the plate 7 edges, and a retracted and protected position, buried between the plates 7.

Before going on describing the guide elements 11, full details are immediately given about the casing 4 structure.

Each casing 4, on its opposite sides, is comprised of two flaps 12 made of resilient material and such positioned that they tend to spread apart spontaneously.

Flaps 12 are provided with attachment areas 13 for connection to a base body 14 and wide apart portions 15 terminating with closure elements or reliefs 15a at an aperture or mouth 16.

The closure elements or reliefs 15 face each other and enable the mouth 16 to be completely occluded when the wide apart portions 15 are sufficiently close to each other.

Preferably, each flap 12 is divided into two sections, so as to emphasize the resiliency of same at each point and has a hollow 17 to facilitate gripping of the contents of a casing 4.

The position of flaps 12 is imposed by said guide elements 11 causing opening and closure of casings 4 simultaneously with positioning of the latter in a radial direction with respect to the rotation axis 8.

In fact, the guide elements 11 are comprised of radial elongated holes 18 formed in the plates 7 and adapted to house pins 19 or similar elements projecting from the base bodies 14, and crosspiece-like elements 20 consisting of bars of circular section transverse to

the plates 7, for example.

The crosspiece-like elements 20 join plates 7 to each other defining said guide channels 6a therewith and are such positioned that they cause the shaped portions 15 to be forcedly moved close to each other during movement of casings 4 from said advanced to said retracted positions.

Essentially, the crosspiece-like elements 20 fix the distance between flaps 12 relative to the radial position of the casing 4 itself, and when said casings are in the retracted position they preferably impose approaching until contact of the closure reliefs 15a.

Practically, casings 4 in the retracted position are closed and protected not only by the protective envelope 2, but also by a second envelope 2a formed of the plates 7 and crosspiece-like elements 20.

Said translation members 10 are at least partly disposed alternately between the plates 7 or outside of the latter.

When the translation members 10 are disposed between the plates 7, they are comprised of a pusher 21, consisting of an air cylinder for example, or a screw-nut screw coupling and an end disc 21a.

The end disc 21a is capable of pushing a base body 14 of a casing 4 from the transferring position 2b, located along said selection path, to said advanced position, close to the aperture 3.

Preferably in said advanced position casings 4 partly jut out of the aperture 3 and are open, as already seen, so that an easy and immediate manual access to the inside of same is enabled.

In order to bring the casings 4 from the aperture 3 back to the inside of the second envelope 2a, when pusher 12 moves backward, return devices 22 defined by springs active on the pins 19 are provided.

When the translation members 10 are located externally of plates 7, they have at least one axially swinging bar 23, structured for example as a movable connecting rod submitted to the action of a drive crank gear 23a or equivalent mechanism.

Bar 23, at its end opposite to the drive crank gear 23a, is provided with a working element 23b adapted to engage a pin 19 radially of axis 8.

In fact, the working element 23b is provided to have, on its side facing the respective plate 7, a transverse channel 23c, extending circumferentially of axis 8 and adapted to allow passage of pins 19 driven in rotation together with plates 7, if the working element 23b is in its position of maximum approaching to axis 8, and, on the contrary, to engage said pins 19 both in a centrifugal and a centripetal direction, when the drive crank gear 23a is operated.

Casings 4 are held within the second envelope 2a, when transferring of same towards the aperture 3 is not operated, by appropriate locking devices, preferably acting on pins 19.

Said locking devices are comprised in particular of a fixed cam 24 extending circumferentially close to the plate 7. The fixed cam 24 is cut out at the transferring

position 2b to enable radial advancing of pins 19 in the centrifugal direction.

In addition, the electric motor 9a, or another appropriate device, prevents rotations of the second envelope 2a which are not enabled by the electronic control means 9.

To increase safety, provision is made between the plates 7 for a blind area 25 which is devoid of casings 4 and engaged by an occlusion plate 20a.

The blind area 25 together with the occlusion plate 20a is located in the transferring position 2b when the apparatus is not used over a certain period of time, based on detections or commands by the electronic control means 9.

The positions of casings 4 which are protected and closed within the second envelope 2a, makes it substantially useless to arrange a movable safety partition at the aperture 3 and said aperture 3 is provided to be completely free or only partly occupied by doors having an accident-prevention function.

For example, freely rotating tipping over covers 26 are provided, the rotation to opening of which is directly carried out, by direct interference or thrust, by the casings 4 engaging the aperture 3.

To increase the accident-prevention safety, photoelectric cells 27 may be provided on the aperture edges, which cells are responsive to the presence of a hand and capable of locking the apparatus. Obviously, the photoelectric cells 27 are deactivated by the electronic control means 9 when the aperture 3 is engaged by a casing 4.

The apparatus may be equipped with several sensors and control means so that all operations are made automatically.

In particular, it is pointed out that a specific embodiment of the invention can be made, as shown in Fig. 3a, which is provided of new means 28 for detecting the presence and amount of banknotes 5 in each casing 4.

In this specific embodiment, casings 4 are completely buried between plates 7 only when they are empty.

The detection means 28 have sensors 28a responsive to the radial position of a casing 4 and therefore responsive to the spreading-apart degree of flaps 12, related to the amount of the banknotes therein present.

Operation of the apparatus is as follows.

First, filling of at least part of casings 4 is executed, and deposit operations are carried out by inserting banknotes into the casings themselves, which are made accessible in succession at the aperture 3.

In fact, the support and movement members 6 move the casings 4 along said selection path so as to enable passage of casings 4 one at a time by the transferring position 2b, internally of the second envelope 2a and protected.

The translation members 10 act on each casing 4 in the transferring position 2b making it move forward until the aperture 3.

In such a position the wide apart portions 15 of

flaps 12 which are not opposed by the crosspiece-like elements 20, move apart from each other widening the mouth 16 to the greatest degree, in order to facilitate manual introduction of also loose banknotes or valuables.

At the end of each deposit operation, the return devices 22 or working device 23b force the casing 4 located close to the aperture 3 to return to the inside of the second envelope 2a.

During this return operation, the crosspiece-like elements 20 push the flaps 12 externally and therefore cause the wide apart portions 15 to approach each other, preferably as far as they close the casings 4.

The electronic control means 9 records the amount of money introduced into each casing 4, in view of the following drawing operations.

In addition, appropriate detection means may intervene to confirm and/or determine the contents of each casing 4.

In the particular case shown in Fig. 3a, the banknotes 5 are oriented so as to engage the casing mouth 16 too, and therefore the admitted amounts force the flaps 12 to an arrangement according to a different mutual distance causing a different retraction degree of the casings between the plates 7. The detection means 28 measures this retraction degree and supply indications about the banknote amounts in each casing 4.

When the initial deposit operations have been completed, drawing operations may be carried out: the electronic control means 9 acts on the support and movement members 6 so that, positioned each time at the transferring position 2b, is the casing 4 which, based on the recorded information, has the required money amount inside it, or an amount immediately higher.

Then said casing 4 is disposed within reach of the person assigned to the drawing operations, a bank cashier for example, thanks to the translation members 10 moving the casings 4 from the transferring position 2b to the aperture 3.

During intervention of the translation members 10 the spontaneous spreading apart of flaps 12 occurs, the casings 4 being completely opened.

If necessary, for one and the same drawing operation, several casings 4 in succession may intervene, so that all the required money amount will be available.

Drawings can be alternated with deposits and in this case casings 4 that may have been left empty or have been emptied due to drawings are made available by the electronic control means 9.

A consecutive execution of both drawing and deposit operations can be suitable also for the purpose of redepositing the change, that is the money amounts drawn in excess. If changes are not redeposited, the electronic control means 9 can carry out subsequent reduced money distributions, that is curtailed of the changes that have not been redeposited.

When the apparatus of the invention is not in operation, or during inactivity or halt periods, the blind area 25 together with the occlusion plate 20a is provided to

be disposed at the transferring position 2b, so as to achieve a further protection of the second envelope 2a at the area thereof which is the closest to the aperture 3.

The above described apparatus of the invention puts into practice a process consisting in imparting two distinct movements to the casings internal of the protective envelope.

The first movement consists in moving the casings along a selection path which is protected and not accessible from the protection envelope aperture.

This first movement of the casings aims at arranging the most appropriate casing to a predetermined transferring position.

The second movement is carried out transversely of the first one and in a direction passing by said transferring position and the protection envelope aperture.

This second movement aims at making the casing previously brought to the transferring position easily accessible from said aperture, for a comfortable manual drawing or deposit.

Thus, easy manual operations involving drawing or insertion even of loose money are possible, as well as moved-away and protected positioning of the remaining casings.

In addition, the process not only offers the facility of protecting each casing when in the transferring position, but also preferably enables it to be kept closed too, while, on the contrary, the same casing is disposed open at said aperture.

To this end an auxiliary opening or closing movement is imposed to each casing.

This auxiliary movement is provided to take place simultaneously with said second movement, so that at the end-of-stroke positions each casing has already been opened or closed, without the occurrence of delays.

In addition, the auxiliary movement is carried out transversely of the second movement, so as not to hinder said second movement, and consists of a spontaneous spreading apart or forced approaching of movable parts of the casings.

Practically the auxiliary movement is interlocked to said second movement.

The invention achieves important advantages.

The apparatus is of simple structure and therefore of high reliability and low cost.

In addition, the apparatus is adapted to increase the money flow rate of a bank counter for example, during both the deposit and drawing (i.e. banknote distribution) steps.

In fact, the radial sliding of the casings enables the latter to be placed to a comfortable position for the cashier's hand.

This comfort is greatly increased and represents an important and very agreeable feature of the apparatus of the invention.

In addition, the radial retraction of the casings and closure of same within the second envelope 2a enables an increased sure safekeeping of the valuables therein

contained.

The safety degree is such that it is not necessary to arrange a safety closure at the access aperture 3, which makes the apparatus still simpler.

It should be also noted that the flexibility and closed and protected position of said casings within the second envelope 2a allows the same to be maintained tightly close to each other, so that practically the maximum part of the room between the plates 7 is utilized.

As a result, the apparatus has a very important capacity, even when the external sizes thereof are not very large.

This storage feature too is particularly appreciated by users, in that a prolonged work independence is allowed.

## Claims

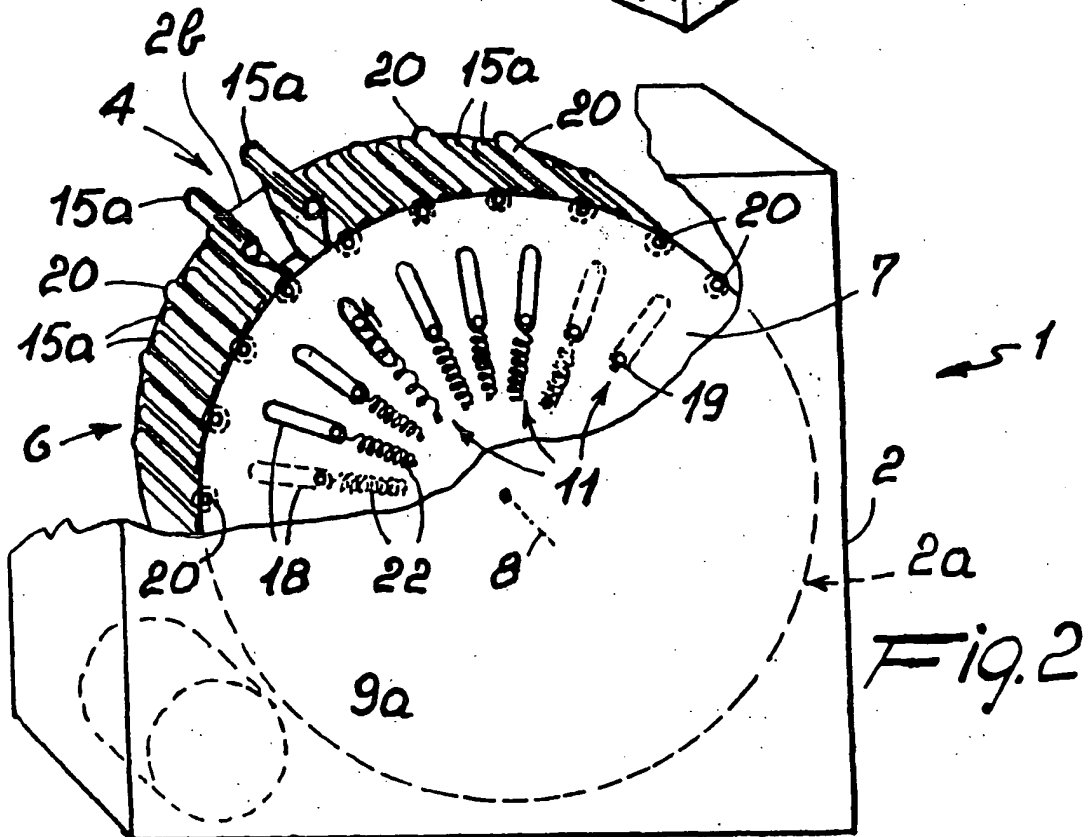
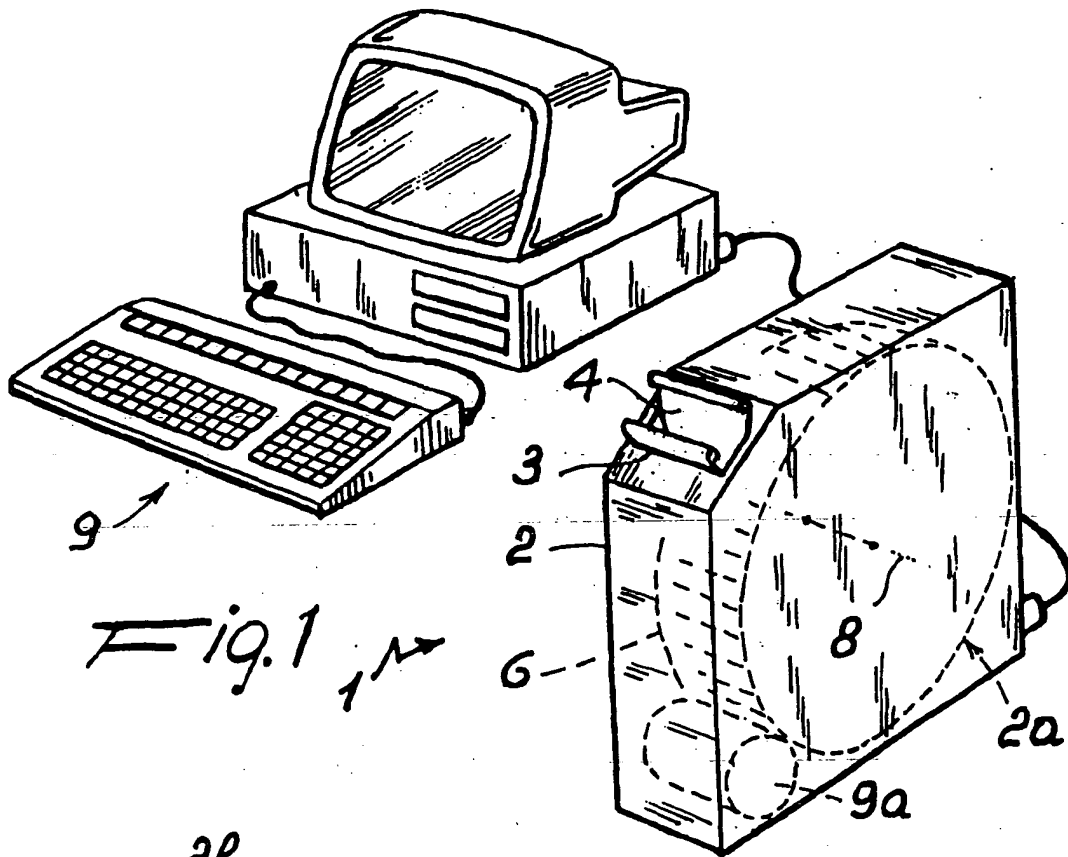
1. An apparatus for conducting deposit and drawing operations of banknotes and valuables, comprising:

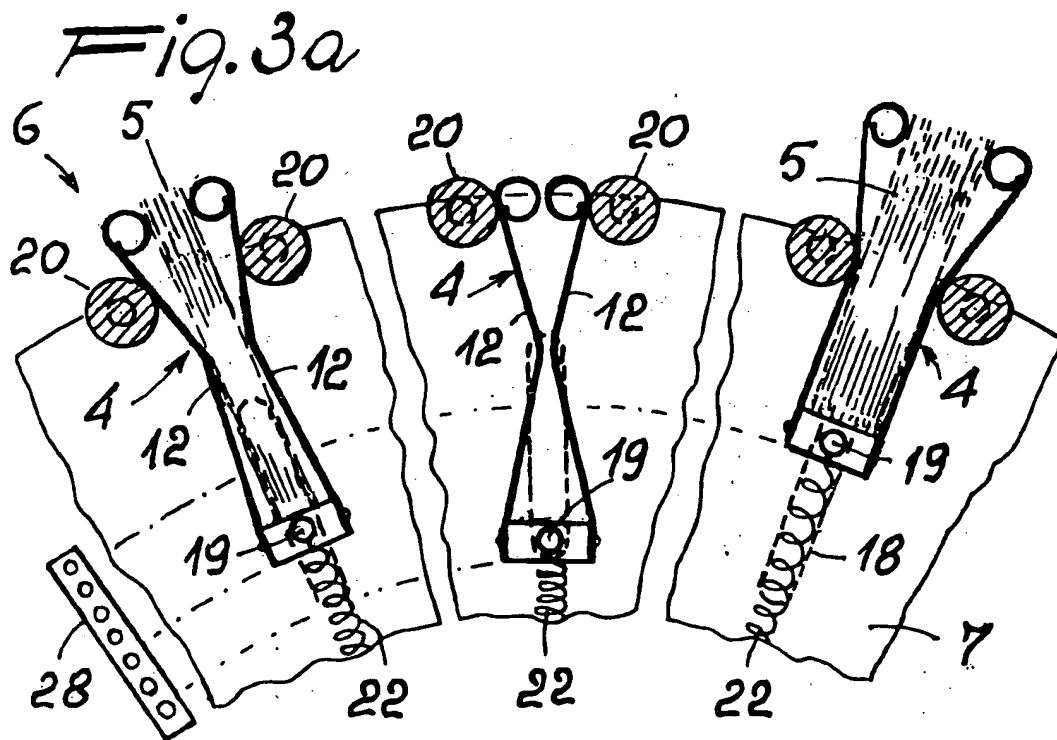
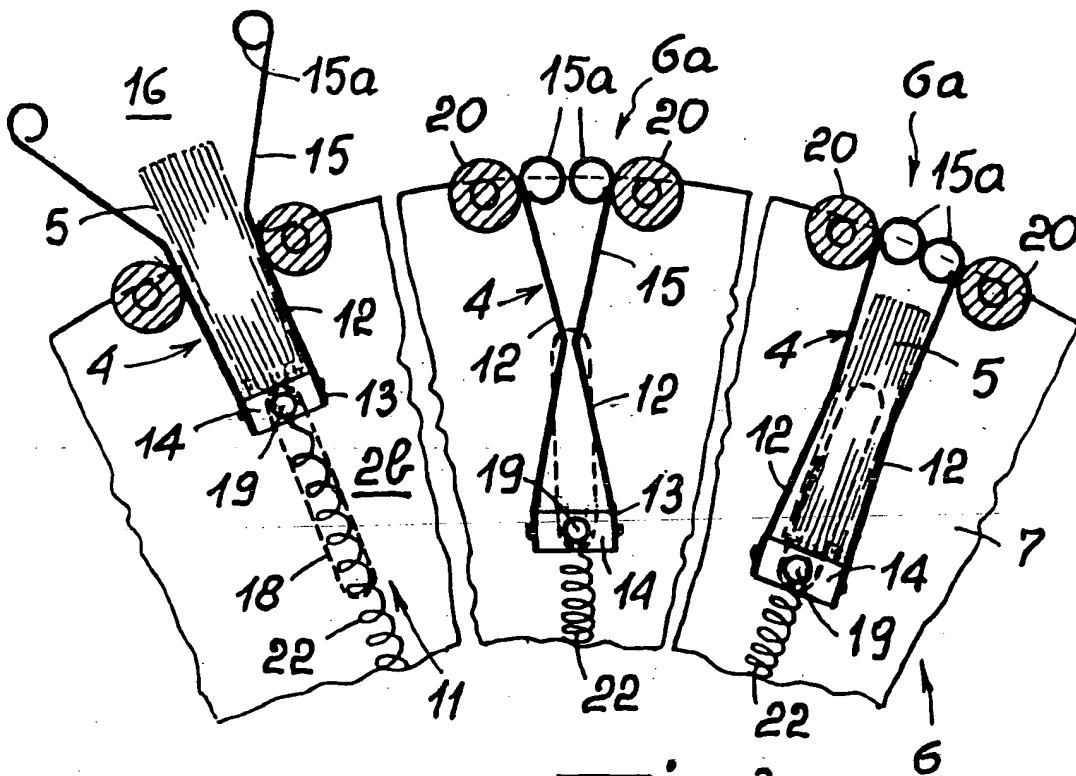
- a protective envelope (2) having at least one aperture (3);
- a plurality of casings (4) for banknotes and valuables (5) located within said protective envelope (2);
- support and movement members (6) engaging said casings (4) and adapted to impose a first movement along a selection path to said casings (4);
- and electronic control means (9);
- characterized in that said casings (4) are movably in engagement with said support and movement members (6), in a transverse direction relative to said selection path;
- and in that translation members (10) are arranged, which are adapted to impose to said casings (4) a second movement transverse to said selection path and passing at least close to said at least one aperture (3), to make said casings (4) accessible to deposits and drawings manually executed through said at least one aperture (3).

2. An apparatus according to Claim 1, wherein said support and movement members (6) form guide channels (6a) transverse to said selection path, said casings (4) being movable in said guide channels (6a) between an advanced position, at least close to said at least one aperture (3), and a retracted position, spaced apart from said at least one aperture (3).

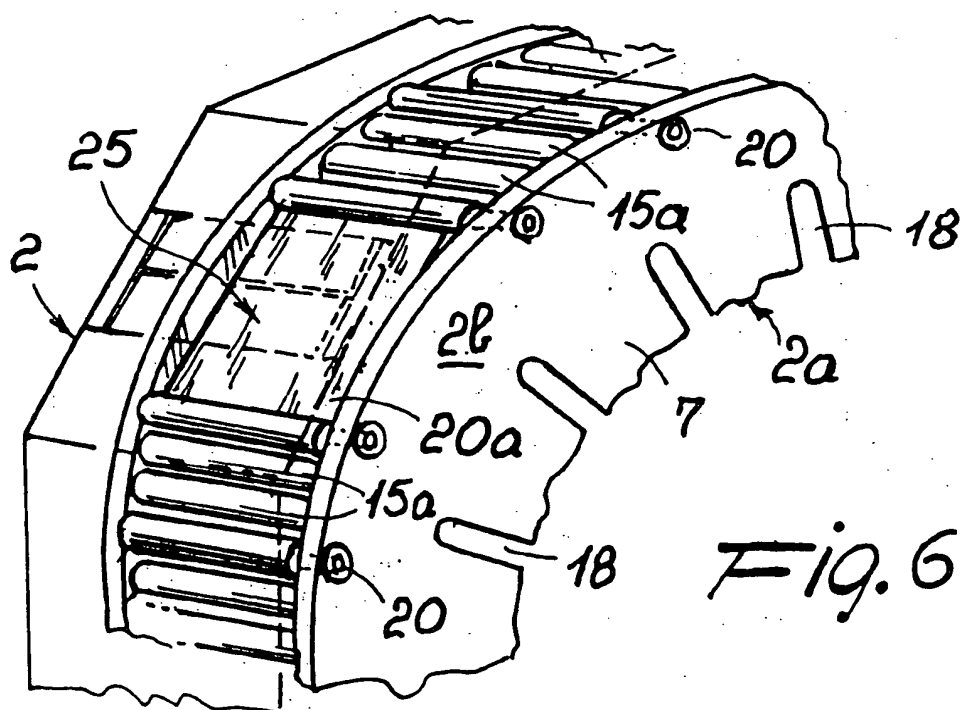
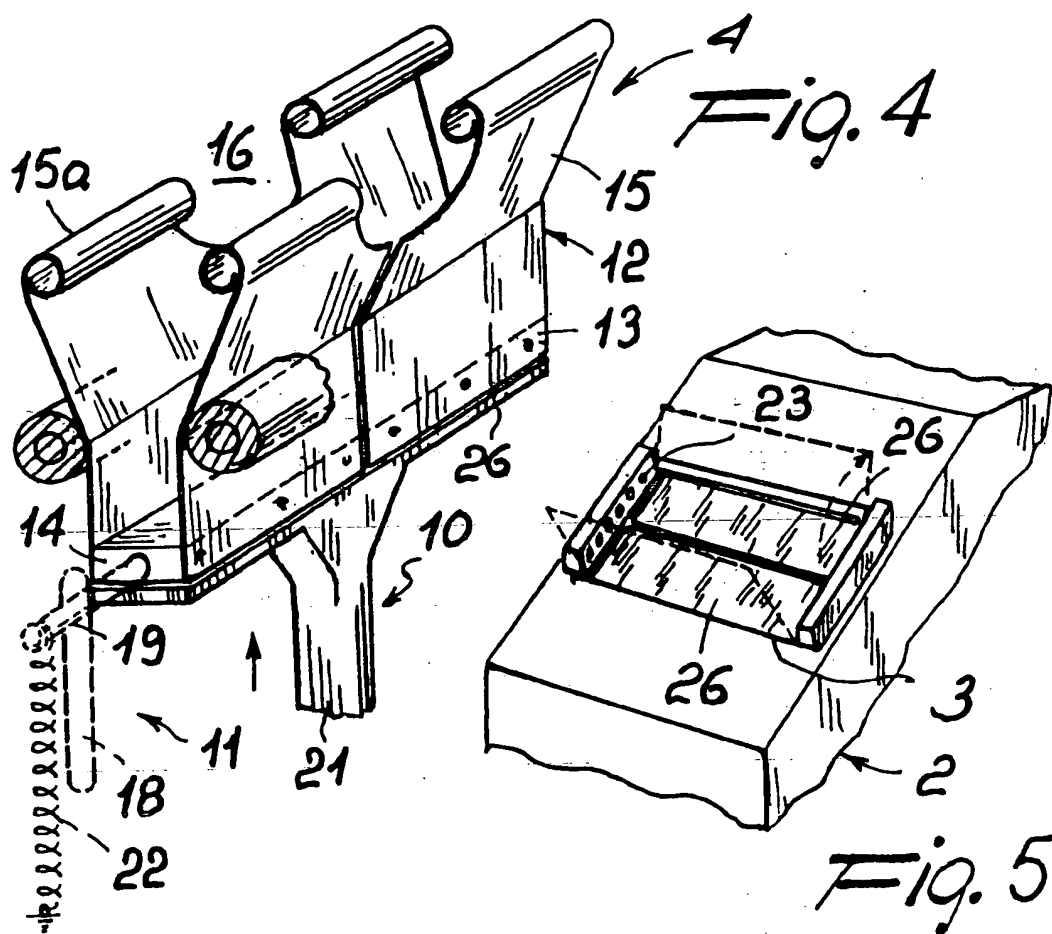
3. An apparatus according to Claim 1, wherein said support and movement members (6) are adapted to house said casings (4) in a substantially closed and protected position, and to substantially form a second envelope internal of said protection envelope (2).

4. An apparatus according to Claim 1, wherein each said casing (4) comprises one base body (14), one mouth (16), and at least two opposite flaps (12) movable apart from each other according to varying distances and extending between said base body (14) and mouth (16), and wherein said flaps (12) are made of a resilient material and are mutually spaced apart in the absence of constraints.
5. An apparatus according to Claim 1, wherein said support and movement members (6) are comprised of two stiff plates (7) disposed in side by side relationship and rotating about a rotation axis (8), crosspiece-like elements (20) joining said plates (7) together, and elongated holes (18) formed in said plates (7) and radial to said rotation axis (8), said elongated holes (18) defining the direction of said second movement, wherein said casings (4) are insert able between said plates (7) and crosspiece-like elements (20), and wherein pins (19) integral with said casings (4) and slidably fitted in said elongated holes (18) are provided.
6. An apparatus according to Claim 5, wherein each said casing (4) comprises flaps (12) made of resilient material and spaced apart from each other in the absence of constraints, and wherein said crosspiece-like elements (20) are adapted to cause the mutual approaching of said flaps (12) by external forcing of the latter when said casings (4) are completely fitted between said plates (7).
7. An apparatus according to Claim 1, wherein said translation members (10) comprise at least one pusher (21) drivingly swingable in an axial direction and adapted to selectively cause advancing of one said casing (4) towards said at least one aperture (3), and return devices (22) active in an opposite direction with respect to said pusher (21).
8. An apparatus according to Claim 1, wherein provision is made for pins (19) integral with said casings (4) and elongated holes (18) formed in said support and movement members (6) and engaged by said pins (19), and wherein said translation members (10) comprise a drivingly swingable bar (23) selectively in engagement with one of said pins (19) in a manner adapted to translate a relative casing (4).
9. An apparatus according to Claim 1, wherein said casings (4) comprise pins (19) externally projecting from said casings, and wherein locking devices for said casings (4) are present which comprise at least one fixed cam (24) active on said pins (19).
10. An apparatus according to Claim 1, wherein a blind area (25) is arranged between said casings (4), which area is adapted to be positioned close to said translation members (10) when the apparatus is not working.
11. An apparatus according to one or more of the preceding Claims, in particular Claim 6, wherein detection means (28) is provided for detecting the banknote amount in each said casings (4), which means is responsive to placing of each said casing (4) in a direction transverse to said selection path, said placing being in connection with the degree of mutual moving away of said flaps (12).
12. A process for conducting deposit and drawing operations of banknotes and valuables in an apparatus comprising a protective envelope provided with at least one aperture and internally having casings for holding banknotes and valuables,
  - consisting in imposing a first movement along a selection path to said casings, to arrange one of them at a predetermined transferring position, along said selection path, which is not accessible from said at least one aperture,
  - and characterized in that it consists in imposing a second movement to said casing in said transferring position, which second movement is transverse to said selection path and passes at least close to said aperture, to make said casing accessible for manually-executed deposit or drawing operations.
13. A process according to Claim 12, wherein said casing is kept closed at said transferring position and is kept open at said aperture, an auxiliary opening movement being also imposed to said casing.
14. A process according to Claim 13, wherein said auxiliary opening movement is carried out in a direction transverse to said second movement and simultaneously therewith.









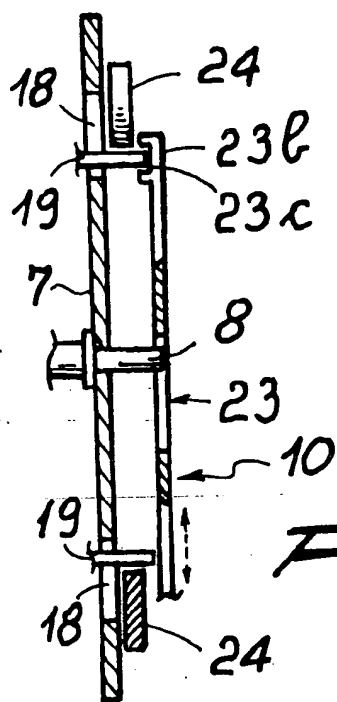


Fig. 7

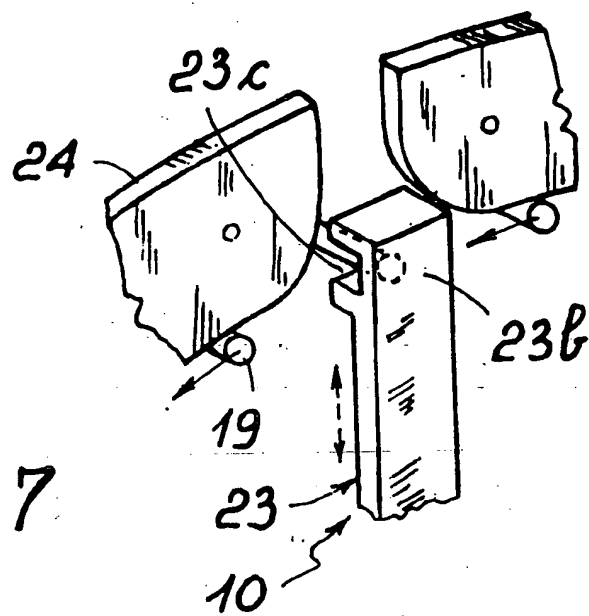


Fig. 8

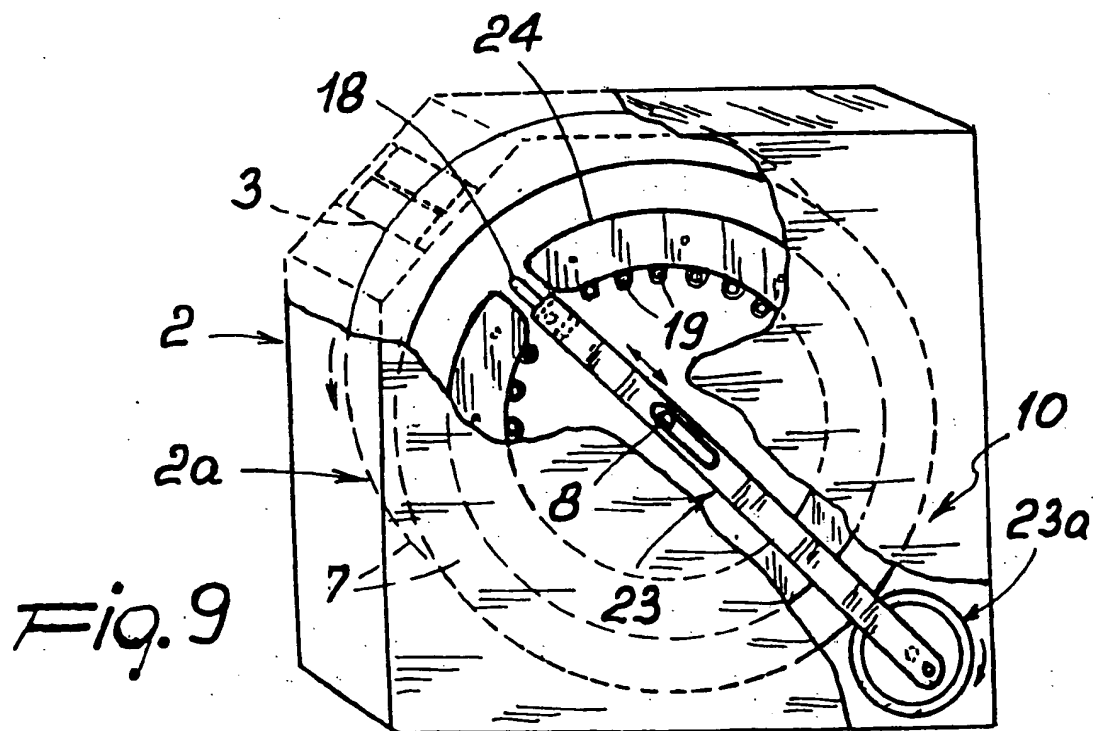


Fig. 9



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# EUROPEAN SEARCH REPORT

Application Number  
EP 95 12 0714

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
D,A	EP-A-0 604 880 (M.I.B. ELETTRONICA SRL) * column 4, line 3 - line 15; figures *	1,4,7, 11,12	G07D11/00
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 31, no. 3, August 1988, ARMONK, NY, USA; pages 432-433, XP002004216 "easily accessible bill dispense box" * the whole document *	1,4, 12-14	
A	DE-A-31 36 610 (PROFESSOR ALFRED KRAUTH APPARATEBAU) * abstract; figures *	1,4,9, 12,13	
A	DE-A-14 49 020 (FIRMA CARL HERMANN) * page 12, last paragraph - page 14, line 1; figures 3,4 *	1,3,12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G07D
Place of search THE HAGUE		Date of completion of the search 30 May 1996	Examiner Neville, D
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  &amp; : member of the same patent family, corresponding document</p>			

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